CORAL ISLANDS AND REEFS.

Die Theorieen über die Entstehung der Koralleninseln und Korallenriffe und ihre Bedeutung für geophysische Fragen. Von Dr. R. Langenbeck. (Leipzig: Wilhelm Engelmann, 1890.)

IN this work, an octavo volume of 190 pages, rather closely printed, Dr. Langenbeck gives a critical history and discussion of the controversy on the origin of coral reefs, commencing with the publication of the first edition of Darwin's well-known book. It consists of a preface, which gives a brief historical summary of the literature of the subject, and six sections. The first one deals with the coral reefs in regions which either are stationary or moving in an upward direction. This deals with the Florida coast, Bahamas, Cuba, Philippines, Solomon Islands, &c. Dr. Langenbeck, in summing up, points out that barrier-reefs, like atolls, can be separated into two classes: the one—such as that off New Caledonia—following the contour of the neighbouring coast line, but separated from it by a deep channel, and rising steeply on the outer side, sometimes from a great depth; the other, like those of Florida—more irregular in disposition, and in close relation with banks of sediment and marine currents.

In the second section Dr. Langenbeck points out that the hypotheses of Murray and Guppy fail to explain the structure of many atolls and barrier-reefs. His argument follows the lines usually adopted by the opponents of these hypotheses, and brings together in a comparatively short compass a large number of important facts. The third section treats of the occurrence of the three types of reefs—fringing-reefs, barrier-reefs, and atolls—in the same neighbourhood, and the evidence of transition from movements in one direction to those in the opposite. The fourth is devoted to a description of the fossil coral reefs in the different geological formations, dwelling especially on their thickness—a matter to which reference has often been made in recent controversies. This, perhaps, is the most valuable portion of the book, for after briefly referring to the difficulties in obtaining the evidence, Dr. Langenbeck gives a summarized account of the coral reefs which hitherto have been observed. Reefs, sometimes of considerable thickness, occur in the Silurian, but they are developed on a much larger scale in the Devonian. In the Asturias they attain a thickness of 100 metres, but this is much exceeded in Western Carinthia, where the maximum thickness amounts even to 700 metres. In the Carboniferous and Permian, reefs, as a rule, are poorly developed, but they are found on a grand scale in the Alpine Trias. These are described, together with a summary of the discussion relating to them since von Richthofen first asserted the dolomite masses of the South-East Tyrol to be ancient reefs. The evidence supplied by the remainder of the Mesozoic and the Tertiary period is reviewed, and that afforded by the hill El Yunque, in Cuba, regarded as an elevated coral reef, which is fully 300 metres thick, is not forgotten. The present distribution of coral reefs is described in the fifth section; and in the last they are discussed in relation to various theories of a more general nature, among them that of Suess in regard to an accumulation of the ocean in equatorial and Polar regions.

Dr. Langenbeck's conclusion as to the main question is nearly the same as that expressed by the editor of the third edition of Darwin's "Coral Reefs" (which he does not appear to have seen), viz. that, while it is not applicable in every instance, yet it is the only one which can explain the peculiarities of very many coral islands and reefs in all three oceans—that is to say, he considers that Darwin's "subsidence" hypothesis holds its own as a general explanation. But whether his conclusion be accepted or not, the value of his book can hardly be questioned as a very full, laborious, and conscientious summary of the observations which have been made since the publication of Darwin's classic work. As a book of reference it will be most useful to all who are interested in the history of coral reefs.

OUR BOOK SHELF.

Fauna der Gaskohle und der Kalksteine der Permformation Böhmens. By Dr. Anton Fritsch. Vol. II. Part 4 (pp. 93–114, pls. 80*b*–90); Vol. III. Part 1 (pp. 1–48, pls. 91–102). 4to. (Prag: Fr. Řivnáč, 1889–90.)

DR. ANTON FRITSCH still continues to issue annual instalments of his great work on the Permian Vertebrata of Bohemia, and the two latest parts are specially devoted to an account of the remarkable Palæozoic group of Elasmobranch fishes, of which *Pleuracanthus* is the earliest described type. No less than twenty-two plates and upwards of sixty figures in the text illustrate the skeletal anatomy of these fishes in a manner that has not hitherto been attempted; and there is a supplemental plate in the first of the two parts representing the finest known example of the Dipnoan genus *Ctenodus*. The Bohemian material at the disposal of Dr. Fritsch is, indeed, so much finer than any previously studied and scientifically described by an ichthyologist that the memoir now before us marks an important advance in our knowledge both of the primitive Elasmobranchii, and to a certain extent also of the Dipnoi.

Ichthyologists of the modern school will scarcely assent to the inclusion of the autostylic Holocephali and the hyostylic Plagiostomi in the same order; but Dr. Fritsch's arrangement of the Pleuracanth fishes and the Acanthodii as two special subdivisions of the last-mentioned group will probably be accepted by all who have followed the most recent researches. In the systematic account of the Pleuracanthidæ the three genera *Orthacanthus*, *Pleuracanthus*, and *Xenacanthus*, are recognized, and described in detail, the two latter also forming the subject of beautiful restored figures. There is a concluding chapter summarizing the general results of the investigation; and this is accompanied by some theoretical remarks on the origin of the so-called archipterygium of Gegenbaur, with a series of diagrams to illustrate the principal stages of its supposed evolution and subsequent specialization. Each of the pectoral fins in the Pleuracanthidæ is a biserial "archipterygium," with a tendency towards becoming uniserial; and, according to Dr. Fritsch, there is no pelvic cartilage, the hitherto reputed pelvic element being truly the basipterygium. The dorsal fin is also primitive in the fact that it is much extended, while its endoskeletal supports are in direct connection and numerical relation with the neural arches of the axial skeleton. Otherwise, many striking resemblances between the Pleuracanthidæ and the modern Notidanidæ are observed, and Dr. Fritsch points out for the first time that these two families agree in the possession of more than five pairs of branchial arches.

A future opportunity may be afforded for a discussion of the principal details of the memoir, and it will suffice

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on the present occasion merely to direct the attention of the pure morphologist, as well as the palæontologist, to one of the most important treatises on fundamental facts that has appeared in the recent literature of the Vertebrata.

A. S. W.

The Life of Ferdinand Magellan. By F. H. H. Guillemard. (London: George Philip and Son, 1890.)

THIS volume belongs to the well-known series, "The World's Great Explorers," and is in every way worthy of the volumes by which it has been preceded. It is curious, as Dr. Guillemard points out, that, while the world is year by year presented with biographies of persons for whom a tithe of Magellan's renown cannot be claimed, no life of the great circumnavigator has yet been published in English. Dr. Guillemard, having resolved to write the present book, set to work in earnest to provide an adequate biography. He consulted many old Spanish documents relating to the subject, and did his best to present in a bright and attractive form the materials thus acquired. A good deal of his work is conjectural, but intelligent readers will have no difficulty in discriminating between the established facts of the story and those parts of it which are based merely on probabilities. After an introductory chapter, in which the way is prepared for the right apprehension of the geographical problems of Magellan's age, the author describes the explorer's early life, his Indian service, and his service with Albuquerque and in Morocco. The most important part of the book, of course, is that which relates to Magellan's last voyage, a most careful and spirited account of which in all its stages, so far as they are known, is given by Dr. Guillemard. This portion of the narrative includes, besides what is told about the discovery of the Strait, chapters on South-east America and the mutiny in Fort St. Julien, the Ladrones and the Philippine Islands, the battle of Mactan and the death of Magellan. We are also told how the survivors of the battle of Mactan arrived at the Moluccas, and how they returned to Spain. The volume is well supplied with maps and good illustrations.

Key to Arithmetic in Theory and Practice. By the late J. Brooksmith, M.A., LL.B. (London: Macmillan and Co., 1890.)

THIS is a most voluminous work, comprising as many as 789 pages. Each example is completely worked out, and the methods adopted are straightforward and clear. The book will be found useful by teachers, and it will be a valuable aid to beginners, whom it will enable to follow each step in detail. The late author evidently devoted a great deal of patient labour to the preparation of the volume: for one fully worked out cube root sum takes no fewer than 1269 figures, while others of the same nature employ as many as seven or eight hundred in their solution.

LETTERS TO THE EDITOR.

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The Cold of 1890–91.

ON a number of days during the present severe frost, the temperature at 4 feet was colder than on the grass, causing the upper portion of trees to become loaded with *hoar*, whilst none was deposited on the lower branches. This was a marked feature here in January 1888, during a long prevalence of dense fog.

On December 11, 1890, at 3 p.m., the temperature was 34°·5 on grass, 33°·0 at 4 feet, and 30°·0 at 20 feet; and on the 26th, at 9 a.m., it was 34°·4 on grass, 33°·5 at 4 feet, and 31°·2 at 20 feet.

From the observations of Mr. G. Fellows at Beeston Fields, near Nottingham, the same increase of cold in the air is shown, and also at the same time. These two reports have been tabulated, using the + sign where the upper temperature was lower than that on the grass. It seems desirable to record this phenomenon. Beeston Fields is 206 feet above the sea, whilst Shirenewton Hall is 530 feet, and situated 5 miles from the Bristol Channel. On one occasion this increase of cold in the lower air caused cirri clouds to form over the water of the Bristol Channel.

The excessive cold of more inland localities is not felt here; our greatest cold has been 14° of frost, whilst at Beeston Fields 27° of frost has been registered.

	Shirenewton Hall.			Beeston Fields.		
1890. Nov.	Greatest Cold.		Difference.	Greatest Cold.		Difference.
	4 Feet.	On Grass.		4 Feet.	On Grass.	
	°	°	°	°	°	°
25	30·0	30·0	0·0	28·8	21·8	– 7·0
26	30·0	29·0	– 1·0	28·2	23·0	– 5·2
27	22·0	20·0	– 2·0	23·8	21·0	– 2·8
28	20 0	20·0	0·0	25·3	21·7	– 3·6
29	21·0	21·0	0·0	32·0	25·2	– 6·8
30	25·5	24·5	– 1·0	23·7	10·7	– 13·0
Dec.						
1	31·0	31·0	0·0	26·8	26·0	– 0·8
2	31·0	31·7	+ 0·7	31·9	32·5	+ 0·6
3	31·4	30·0	– 1·4	33·4	31·7	– 1·7
4	34·0	34·0	0·0	34·7	34·0	– 0·7
5	34·0	33·0	– 1·0	36·7	36·2	– 0·5
6	26·0	25·0	– 1·0	35·6	34·7	– 0·9
7	30·0	29·0	– 1·0	29·8	23·0	– 6·8
8	30·0	30·0	0·0	32·2	30·0	– 2·2
9	23·0	22·0	– 1·0	28·4	29·0	+ 0·6
10	29·0	30·0	+ 1·0	28·4	30·7	+ 2·3
11	29·1	30·2	+ 1·1	29·3	30·0	+ 0·7
12	24·0	23·0	– 1·0	27·3	28·0	+ 0·7
13	24·9	25·0	+ 0·1	27·4	23·0	– 4·4
14	19·2	19·0	– 0·2	13·4	10·2	– 3·2
15	19·5	16·9	– 2·6	15·8	11·8	– 4·0
16	24·0	19·5	– 4·5	27·5	23·3	– 4·2
17	26·0	26·0	0·0	30·8	27·7	– 3·1
18	26·0	24·0	– 2·0	28·3	27·4	– 0·9
19	26·5	28·0	+ 1·5	24·0	28·0	+ 4·0
20	18·0	16·9	– 1·1	19·4	22·8	+ 3·4
21	23·8	23·6	– 0·2	12·9	8·2	– 4·7
22	20·9	19·8	– 1·1	4·9	4·7	– 0·2
23	24·0	24·1	+ 0·1	11·0	10·7	– 0·3
24	29·5	28·0	– 1·5	25·5	24·8	– 0·7
25	23·0	24·5	+ 1·5	22·9	23·0	+ 0·1
26	25·4	28·2	+ 2·8	23·7	24·8	+ 1·1
27	31·0	29·0	– 2·0	28·0	27·3	– 0·7
28	29 0	27·0	– 2·0	27·8	28·0	+ 0·2
29	28·0	27·0	– 1·0	28·0	27·8	– 0·2
30	20·9	20·7	– 0·2	22·8	19·8	– 3·0
31	17·9	17·7	– 0·2	21·0	21·6	+ 0·6
1891. Jan.						
1	20·7	19·7	– 1·0	24·9	24·4	– 0·5
2	26·8	27·8	+ 1·0	30·7	28·4	– 2·3
3	27·6	27·6	0 0	23·4	24·5	+ 1·1
4	33·1	26·7	– 6·4	28 5	29·0	+ 0·5
5	25·1	22·7	– 2·4	28·7	26·1	– 2·6
6	24·0	21·7	– 2·3	24·8	21·7	– 3·1
7	19·5	17·9	– 1·6	20·5	15·8	– 4·7
8	22·3	14·9	– 7·4	21·0	17·6	– 3·4
9	27·3	27·3	0·0	21·2	20·0	– 1·2
10	26·9	26·9	0 0	24·0	19·3	– 4·7
11	22·7	15·7	– 7·0	18·8	14·6	– 4·2
Min.	17·9	14·9		4·9	4·7	

Shirenewton Hall, Chepstow.

E. J. LOWE.

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